

On Further Colonies of *Placostylus* Land Snails from Northernmost New Zealand.

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Abstract.

This paper is supplementary to my 1947 "Distribution of *Placostylus* Land Snails in Northernmost New Zealand." Further field work has resulted in the discovery of more living colonies and a number of additional subfossil sites. The primary purpose of this paper is to describe sixteen new subspecies. On the completion of the field work it is proposed to publish a distributional map and to discuss more fully the significance of the distributional pattern.

Placostylus (*Maoristylus*) *ambagiosus michiei* n. subsp. Pl. 28, fig. 1.

A lightly built shell of distinctive colouring, with obscure spiral malleations and a simple peristome bearing a weakly developed basal tubercle only. Spire slender, 36° - 39° , Aperture 2.12 to 2.20 total height of shell. Colour of epidermis Buckthorn-brown, and Dresden-brown, Mars-brown and Chestnut-brown (Ridgway, Pls. 14 & 15); peristome orange-rufous (Ridgway, Pl. 2); Interior of aperture with a slight bluish grey smear of callus; brown epidermal colour showing through, where not clouded by callus. A narrow white line submargins the suture.

Height.	Diameter.	Apertural ht.	Spire angle.
70.0 mm.	32.5 mm.	33.5 mm.	39° (holotype)
70.5 mm.	31.0 mm.	33.0 mm.	38°
74.5 mm.	31.5 mm.	34.0 mm.	36°

Holotype and paratypes in Auckland Museum.

Locality: Kerr Point herbfield, North Cape block, under the matted aprons of stunted flax (*Phormium*) near the eastern margin of the herbfield and only along the coastal ridge.

Associated plants in the vicinity of the snail occurrences are *Hebe speciosa brevifolia*, Cheesem., *Cassinia amoena* Cheesem., and *Leucopogon richiei* R. Br.

The herbfield is sparse and the growth nowhere more than three feet in height. It is on a hard pan and gets very dry in summer. The food plant was not ascertained, but it is certainly not karaka, which is absent from the herbfield. Strangely enough, the apparently better conditions on the seaward cliff face below the herbfield, where a higher growth of coastal scrub with karaka occurs, no examples of *Placostylus* were found.

The subspecies *michiei* seems to have evolved with the herbfield, which would appear therefore to be a community of some antiquity.

I am indebted to Mr. R. H. Michie, of Kaitaia who brought this colony to my notice.

This subspecies and typical *ambagiosus* from Cape Maria van Diemen Island are the only New Zealand members with a chestnut brown epidermis and an orange apertural callus. The true relationship,

however, is with *watti*, from coastal forest along the eastern margin of the North Cape block. Both *watti* and *michiiei* exhibit spiral malleations, a feature not observed in the other subspecies. From *watti* the subspecies *michiiei* is distinguished by its different colouring, thin shell and the reduction of the apertural processes to one basal tubercle.

Placostylus (Maoristylus) ambagiosus watti Powell, 1947.

1947.—*Placostylus (Maoristylus) ambagiosus watti* Powell, Rec. Auck. Inst. Mus. 3 (3), p. 187, pl. 22, f. 10, 11 (only).

Type locality: Midway between Waikuku Beach and North Cape Lighthouse, 10-30 feet elevation and from 25 to 200 feet back from the boulder beach.

Only five examples were taken from the type locality, which has since been destroyed by fire. However, a more extensive colony was discovered by Mr. N. Gardner last year on the cliff face about half a mile south of the North Cape.

I now find that I was mistaken in associating with *watti* the subfossil colonies from Tom Bowling Bay and Waikuku Beach. The latter have all five apertural processes strongly developed, especially the parietal tubercle. This influenced me to regard the apertural formula of *watti*, in the broad sense, to be 3, 3, 3, 3, 3. The norm of *watti* is now shown to be a lightly built shell with an apertural formula of 2, 2, 2, 0, 0, occasional examples, such as the holotype, show a very weak parietal tubercle. Also, the epidermal colour of those living under normal shaded conditions is shown to be darker, a rich dark-chocolate.

Placostylus (Maoristylus) ambagiosus gardneri n. subsp. Pl. 28, fig. 8.

1947.—*Placostylus (Maoristylus) ambagiosus watti* Powell, Rec. Auck. Inst. Mus. 3 (3), p. 187, pl. 22 (in part), f. 12, 13.

This is a heavier shell than *watti* and has all five apertural processes well developed, especially the parietal tubercle. It occurs in the consolidated dunes at Tom Bowling Bay and in the loose dunes at Waikuku and Whareana. Its evolutionary descendant is undoubtedly the recent *ambagiosus whareana*, described following.

Height.	Diameter.	Apertural ht.	Spire angle.
74.0 mm.	35.0 mm.	36.0 mm.	48°
78.5 mm.	36.0 mm.	38.5 mm.	48° (holotype)
81.0 mm.	34.0 mm.	37.0 mm.	44°

Localities: Tom Bowling Bay, along almost the full length of the beach, with *Rhytida duplicata*, weathering out in situ from the underlying consolidated dunes. Remains of trunks and limbs of puriri and pohutukawa indicate the former presence of coastal forest on the site during a post-Pleistocene moist period (type); Waikuku Beach in loose dunes mainly along the middle section of the beach; Whareana Beach in loose dunes extending S.E. from Wharekawa Point to about the middle of the beach and approximately in front of the living colony of *ambagiosus whareana*.

Holotype and paratypes in Auckland Museum.

Placostylus (Maoristylus) ambagiosus whareana n. subsp. Pl. 28, fig. 2.

Evidently the recent descendant of the subfossil *gardneri*, from which it differs in the absence of the parietal tubercle. The apertural formula is 3, 3, 3, 3, 0. No other recent subspecies has the three processes of the inside of the outer lip so heavily and constantly developed.

The coloration is the same as for *annectens*; that is, russet to mars brown, diffused with warm-sepia and very narrow white subsutural line. Aperture deep red-brown within and light ochraceous salmon on reflected edge of peristome.

Height.	Diameter.	Apertural ht.	Spire angle.
79.5 mm.	35.0 mm.	40.0 mm.	44° (holotype)
83.0 mm.	35.0 mm.	40.0 mm.	42°
80.0 mm.	36.5 mm.	40.0 mm.	43°

Locality: Whareana, east coast between Waikuku Beach and Parengarenga in a steep valley to the north of Whareana Stream. Abundant in mixed forest, chiefly under kohekohe (*Dysoxylum spectabile* Hook). It does not seem to occur in the considerable area of forest in the valley of the Whareana Stream. First discovered by Mr. N. Gardner.

Holotype and paratypes in Auckland Museum.

Placostylus (Maoristylus) ambagiosus hancoxi n. subsp. Pl. 28, fig. 3.

Although this subspecies has only a moderate development of the apertural processes the peristome is heavily callused externally as in *waiti*, *gardneri*, *whareana* and *annectens*. It is of the size of *whareana*, but has much weaker inner lip processes and the addition of a weak parietal tubercle. It is much smaller than *annectens*, in which a parietal tubercle is present also.

The shape and coloration is exactly as in *whareana*.

Height.	Diameter.	Apertural ht.	Spire angle.
79.0 mm.	35.0 mm.	38.5 mm.	43° (holotype)
75.0 mm.	34.0 mm.	38.0 mm.	44°
79.0 mm.	34.5 mm.	38.5 mm.	40°

Locality: Near crest of second coastal ridge N.W. of Maukin's Nook, between Waikuku Beach and Parengarenga Harbour. Only eight adults were taken, apparently the last remnant of a former colony along this ridge, which has been devastated by fires. A considerable area of forest down the southern slope did not produce further material. (A. Hancox, R.A. Prouse, H. S. Prouse, R. H. Michie, and A.W.B.P., April, 1950.)

It would appear that members of the *ambagiosus* series live chiefly on the seaward cliff faces and rarely further inland, to a distance of not more than a mile, but in such cases only on or near the crests of ridges.

Holotype and paratypes in Auckland Museum.

Placostylus (Maoristylus) ambagiosus spiritus Powell, 1947.
Pl. 28, fig. 5.

1947.—*Placostylus (Maoristylus) ambagiosus spiritus* Powell. Rec. Auck. Inst. Mus. 3 (3), p. 185.

The type locality for this subspecies is in loose post-Pleistocene dunes two to three miles east of Pandora, Spirits Bay. I have since located numerous former colonies ranging intermittently from the type locality eastwards along the coastal dunes to within a few hundred yards of Maungapiko, at Kapowairua, the eastern end of Spirits Bay Beach.

There is considerable size variation in these subfossil colonies and one, at 1 mile west of Maungapiko, on the first dune from the beach, is the smallest member of the *ambagiosus* series yet discovered. Adults

range from 48-64 mm. in height. Subfossil *Austrosuccinea archeyi* were associated, indicating dwarfing and then extinction of the colony by the succession to a sand-grass dune community.

In my 1947 paper I attributed to *spiritus* the then recently discovered Recent colony from the cliff face $\frac{3}{4}$ mile west of Pandora. A visit to the locality, affording study of ample material, shows that this Recent colony is nearer to the dwarf colony referred to above than to *spiritus*.

It is significant that there is a gap of about three miles between the Recent colony and the nearest subfossil occurrences of *spiritus*.

Table of dimensions of *spiritus* colonies.

	Max.-size (mm.)	Min. size (mm.)	Average size (mm.) (10 examples)
$\frac{1}{4}$ m. w. of Maungapiko	77.0 x 34.0	—	—
$\frac{1}{2}$ m. w. of "	79.0 x 32.0	74.0 x 31.5	76.25 x 31.50
$1\frac{1}{2}$ m. w. of "	77.0 x 31.5	69.0 x 31.0	73.50 x 31.15
2 m. w. of "	76.0 x 32.0	69.0 x 28.5	72.55 x 30.90
$2\frac{1}{2}$ m. w. of "	75.0 x 30.0	68.5 x 30.5	70.40 x 29.85
3 m. w. of "	73.0 x 30.0	63.5 x 27.0	69.80 x 29.90
$3\frac{1}{2}$ m. w. of "	75.0 x 32.0	66.0 x 27.0	70.00 x 28.80
Type loc.	75.0 x 32.0	64.0 x 28.0	68.75 x 29.15

***Placostylus (Maoristylus) ambagiosus pandora* n. subsp. Pl. 28, fig. 4.**

This subspecies is characterised by its small size, and very dark epidermis. Only the basal tubercle is developed. The nearest approach to the epidermal colour in Ridgway is warm blackish-brown (Pl. 39), aperture deep red-brown within and light ochraceous salmon on reflected edge of peristome.

Locality: In a small remnant of coastal forest, half way up cliff face, $\frac{3}{4}$ mile west of Pandora. The terrain is boulder strewn covered with masses of *Muchlenbeckia*. The snails occur under this growth as well as under boulders and around the bases of *Phormium*, that is within the leaf fall area of several large karaka (*Corynocarpus lacvigata*) (type); subfossil on first coastal dune 1 mile west of Kapowairua, Spirits Bay. (AW.B.P., 21:3:1949.)

Height.	Diameter.	Apertural ht.	Spire angle.
67.5 mm.	31.0 mm.	34 mm.	40° (holotype)
71.0 mm.	31.0 mm.	35 mm.	43°
61.5 mm.	29.0 mm.	31 mm.	43°
64.0 mm.	28.0 mm.	29 mm.	42° (1 m. w. Maungapiko)
48.0 mm.	20.5 mm.	21 mm.	36° (1 m. w. ")

Holotype and paratypes in Auckland Museum.

***Placostylus (Maoristylus) ambagiosus paraspiritus* n. subsp. . Pl. 28, fig. 7.**

A living colony on a small, almost detached headland one mile south of Cape Maria van Diemen and a few hundred yards west of the type locality for *priscus* bears a strong resemblance to subfossil *spiritus*, from the Spirits Bay dunes. The living colony, however, appears to have existed in situ for a long time, as evidenced by subfossil *Placostylus* three to four feet down in consolidated sand underlying the Recent colony. Only one adult subfossil was taken and it is dwarfed and senile, apparently abnormally short and inflated, 63 mm. x 30 mm.; with a *priscus* style of aperture (Pl. 28, fig. 7. Associated with this subfossil *Placostylus* were numerous *Rhytida duplicata*, indicating con-

temporary coastal forest conditions, and near the surface *Austrosuccinea* remains, pointing to a sand-grass community, now succeeded by a shrub-dune community, resulting in the extinction of *Austrosuccinea*. During the xerophytic sand-grass community phase the *Placostylus* probably survived on the steep seaward cliff face.

Although *spiritus* and *paraspirtus* are very similar in size, form and the apertural processes, it is evidently a case of near convergence, for *spiritus* is a Post-Pleistocene fossil with a Recent derivative, *pandora*, in its own area, which is situated no nearer than six miles from the *paraspirtus* colony and with two subfossil subspecies, *priscus* and *lesleyae* ranged in between. No Recent colony has been located between *paraspirtus* and *pandora*, but the report of a comparatively fresh specimen taken below the lighthouse at Cape Reinga remains to be investigated. See locality map, Powell, 1947, Rec. Auck. Inst. Mus. 3 (3), p. 188, Pl. 23.)

Compared with *spiritus*, *paraspirtus* differs in having the three outer lip processes weakly developed and no thickening on the columella. In *spiritus* the uppermost process of the outer lip is mostly quite as well developed as the basal tubercle. Neither has a parietal tubercle. The apertural formula for *spiritus* is 2, 2, 3, 1, 0 and for *paraspirtus* 1, 1, 2, 0, 0. (See folder plate, Powell, 1947, l.c.p. 188, pl. 25.)

Coloration warm blackish-brown. Aperture deep red-brown within and light ochraceous salmon on reflected edge of peristome.

Height.	Diameter.	Apertural ht.	Spire angle.
72.25 mm.	32.0 mm.	35.5 mm.	40° (holotype)
72.00 mm.	32.5 mm.	36.0 mm.	41°
70.50 mm.	30.5 mm.	34.0 mm.	39°

Max. size.	Min. size.	Average size (10 examples).
73.5 mm. x 31.0 mm.	66.5 x 29.5 mm.	70.80 mm x 31.75 mm.

Locality: On steep seaward face of small rounded headland about one mile south of Cape Maria van Diemen. Under flax, small karaka and other stunted coastal scrub. First discovered by Mr. R. H. Michie, of Kaitaia.

Holotype and *paratypes* in Auckland Museum.

Summary of distribution of *Placostylus ambagiosus* & subspecies. († = new locality records)

Placostylus ambagiosus ambagiosus Suter, 1906.

Recent. Cape Maria van Diemen (Island), Small colonies in flax (*Phormium*) clumps on the south-west cliff face. (Type) Restricted to the Island. x (see footnote).

Placostylus ambagiosus hinemoa Powell, 1947.

Subfossil. Cape Maria van Diemen (Island), in consolidated sands. Pleistocene or early Post-Pleistocene (type) Restricted to the Island.

Placostylus ambagiosus worthyi Powell, 1947.

Subfossil. Cape Maria van Diemen (Mainland), on north-eastern side of headland, formerly an island but now linked to the mainland by a tombolo of consolidated and drifting sand (type); on a small island, accessible by wading at low tide, half a mile south of type locality (A. Hancox and A.W.B.P., 18:11:1948); in loose sandy humus, with *Austrosuccinea* remains†; on a former islet $\frac{3}{4}$ mile south of type locality and just off the western escarpment of the "*priscus* block," in coarse cemented shell sand†.

***Placostylus ambagiosus consobrinus* Powell, 1938.**

Subfossil—Recent. Cape Maria van Diemen (Mainland) at type locality for *worthyi* but in the overlying loose sand. A Recent example with epidermis intact was found here last year by Mr. B. S. Bird.

***Placostylus ambagiosus priscus* Powell, 1938.**

Subfossil. Cape Maria van Diemen (Mainland) about three-quarters of a mile east of *worthyi* type locality in consolidated dunes (type); many former colonies on south and eastern slopes of Herangi, 700 feet, down to Te Werahi Stream and Swamp; Twilight Beach between Cape Maria van Diemen and Scott's Point (N. Gardner)†; one mile south of Te Paki Stream and one-quarter mile inland in consolidated dunes (Miss Lesley Keene)†.

***Placostylus ambagiosus paraspiritus* n. subsp.**

Recent. On headland one mile south of Cape Maria van Diemen (Mainland) (type)†.

***Placostylus ambagiosus lesleyae* Powell, 1947.**

Subfossil. Taputaputa Bay, east of Cape Te Reinga, in consolidated dunes (type); in consolidated dune on eastern side of Cape Te Reinga (E. Richardson)†.

***Placostylus ambagiosus spiritus* Powell, 1947.**

Subfossil. Spirits Bay, two to three miles east of Pandora in loose dunes (type); eastward along coastal dunes to Kapowairua†.

***Placostylus ambagiosus pandora* n. subsp.**

Subrecent—Recent. On cliff face three-quarters of a mile west of Pandora (type, Recent); first coastal dune, one mile west of Kapowairua, Spirits Bay (subrecent)†.

***Placostylus ambagiosus keenorum* Powell, 1947.**

Recent. Maungapiko, 50-150 feet, Kapowairua, eastern end of Spirits Bay.

***Placostylus ambagiosus annectens* Powell, 1938.**

Recent. Unuwahao, 900 feet, on track between Spirits Bay and Tom Bowling Bay (type); coastal ridge, north of Unuwahao, 850 feet†; The Huka, 30-40 feet, above stream, east side of headland†.

***Placostylus ambagiosus wattii* Powell, 1947.**

Recent. At base of cliff midway between North Cape and Waikuku Beach (type); on cliff half a mile south of North Cape, 50 to 100 feet (N. Gardner)†.

***Placostylus ambagiosus michiei* n. subsp.**

Recent. Kerr Point herbfield, North Cape Block†.

***Placostylus ambagiosus gardneri* n. subsp.**

Subfossil. Tom Bowling Bay in consolidated coastal dunes (type); Waikuku Beach in loose dunes; Whareana Beach in loose dunes†.

***Placostylus ambagiosus whareana* n. subsp.**

Recent. Valley to north of Whareana Stream, between Waikuku Beach and Parengarenga†.

***Placostylus ambagiosus hancoxi* n. subsp.**

Recent. Crest of second coastal ridge north-west of Maukin's Nook, between Whareana and Parengarenga†.

FOOTNOTE:

x Suter (1913, Man. N.Z. Moll., pp. 767-768) recorded *Placostylus hongii* from Kaitaia and Mangonui and *hongii ambagiosus* from Kaitaia. I have examined the material in the Suter collection upon which these identifications were made and find that they are all *ambagiosus ambagiosus*, the typical subspecies, which in the Northernmost block is definitely restricted to Cape Maria van Diemen Island.

However, I am assured by Mr. Harry Matthews, of Kaitaia that his wife collected the Kaitaia snails recorded by Suter from near the bank of a river amongst karaka and flax on her father's farm (Mr. Dunn) three miles south of Kaitaia in about 1888.

Regarding the Mangonui record, Mr. A. Hancox collected six bleached, worn shells of *ambagiosus ambagiosus* from the dunes at Aurere, southern end of the Tokerau Beach, about 1934.

The Kaitaia locality is too far inland to have been a natural occurrence. A fairly thorough search of the Tokerau dunes was made last year but no further examples of *Placostylus* were seen, although subfossil *Rhytida dunniac* and various *Charopidae* were common.

Since both the Kaitaia and Mangonui localities are about seventy miles distant from the Cape Maria van Diemen Island type locality and that this typical subspecies is clearly the evolutionary product of insular isolation I can only regard these two mainland occurrences as resultant from human transportation.

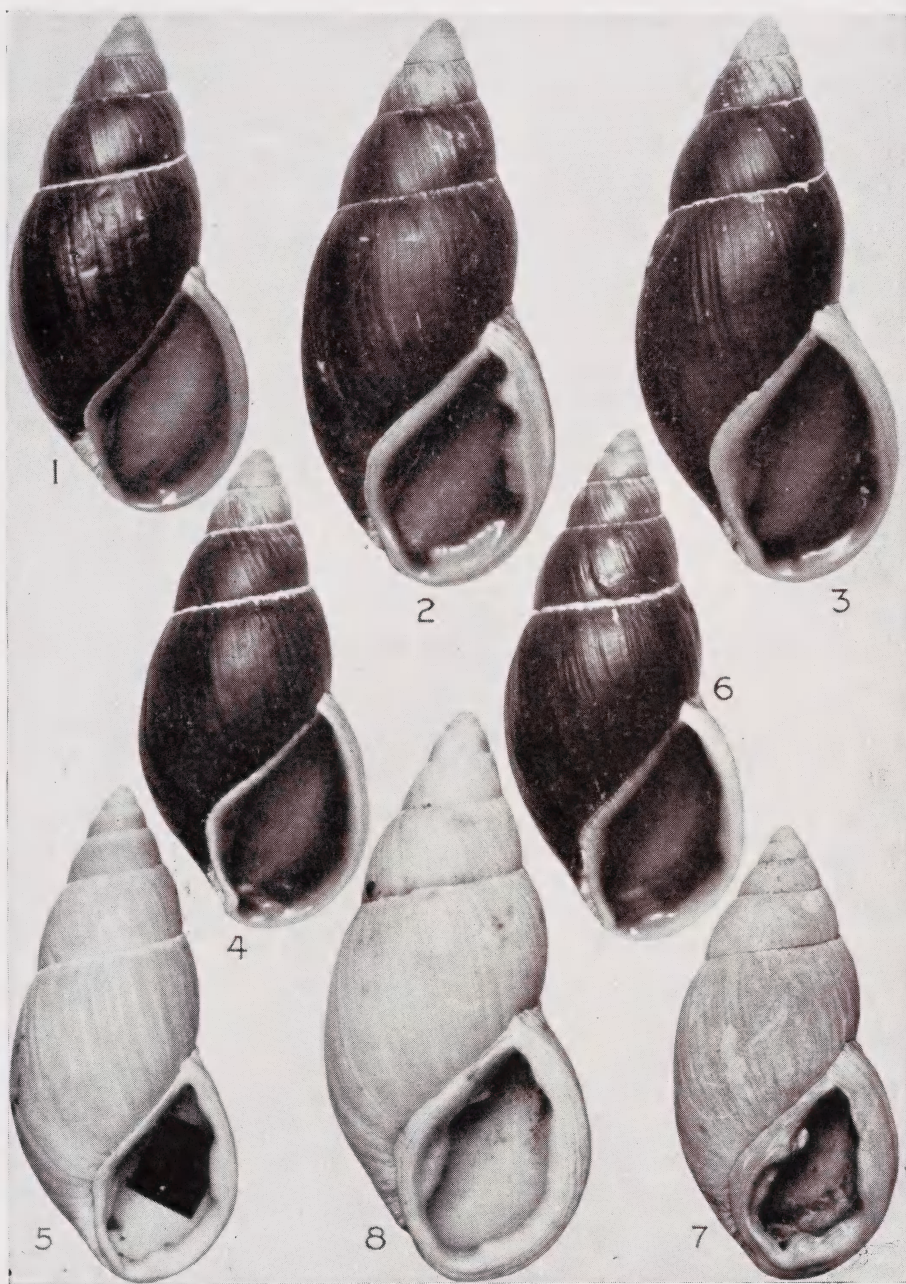


Fig. 1: *Placostylus* (*Maoristylus*) *ambagiosus michiei* n. subsp., Kerr Point (holotype). Fig 2: *P. (M.) ambagiosus whareana* n. subsp., Whareana (holotype). Fig. 3: *P. (M.) ambagiosus hancoxi* n. subsp., second ridge N.W. of Maukin's Nook (holotype). Fig. 4: *P. (M.) ambagiosus pandora* n. subsp., near Pandora (holotype). Fig. 5: *P. (M.) ambagiosus spiritus* Powell, 1947, Spirits Bay loose dunes, subfossil (holotype). Fig. 6: *P. (M.) ambagiosus paraspiritus* n. subsp., one mile S. of Cape Maria van Diemen (holotype). Fig. 7: *P. (M.) ambagiosus* subsp. ? 3-4ft. below *paraspiritus* colony in consolidated sand (note: the parietal process is an abnormality). Fig. 8: *P. (M.) ambagiosus gardneri* n. subsp., Tom Bowling Bay, subfossil, consolidated sand (holotype). (All to uniform scale.)